Exemption No. 5765

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
RENTON, WASHINGTON 98055-4056

In the matter of the petition of

Dornier Luftfahrt GmbH **Regulatory Docket No. 27432**

for an exemption from § 25.562(c)(5)
of the Federal Aviation Regulations

PARTIAL GRANT OF EXEMPTION

By letter EL10-870/93, Issue A, dated August 10, 1993, Messers Krause and Gritzbach, Airworthiness Office and Interiors Design Office, respectively, Dornier Luftfahrt GmbH, Postfach 1303, D-7900 Friedrichahafen 1, Federal Republic of Germany, petitioned for an exemption from the Head Injury Criterion (HIC) of § 25.562(c)(5) of the Federal Aviation Regulations (FAR), for front row passenger seats located behind bulkheads in Dornier Model 328 airplanes, until June 30, 1994.

Sections of the FAR affected:

Section 25.562(c)(5), as amended by Amendment 25-64, requires that each occupant must be protected from serious head injury under the dynamic test conditions prescribed in paragraph (b) of this section. Where head contact with seats or other structure can occur, protection must be provided so that the head impact does not exceed a HIC of 1,000 units. The level of HIC is defined by the equation:

$$HIC = \left[(t_2 - t_1) \left[\frac{1}{(t_2 - t_1)} \int_{t_1}^{t_2} a(t)\, dt \right]^{2.5} \right]_{max}$$

Related Section of the FAR:

Section 25.785(a), as amended by Amendment 25-64, requires that each seat, berth, safety belt, harness, and adjacent part of the airplane at each station designated as occupiable during takeoff and landing must be designed so that a person making proper use of those facilities will not suffer serious injury in an emergency landing as a result of inertia forces specified in §§ 25.561 and 25.562.

ANM-93-040-E

The petitioner's supportive information is as follows:

> "Dornier Luftfahrt is submitting a petition for temporary exemption until June 30, 1994, from the requirement for a maximum Head Injury Criterion (HIC) of 1000 units of FAR 25.562(c)(5) for passenger seats located behind the cockpit/cabin bulkhead (RH) and behind the bulkhead (LH).
>
> "1. Granting this temporary exemption would be in the public interest because the safety standard of the seats concerned is equivalent to nearly all existing airplanes in service.
>
> "2. At the moment state-of-the-art does not enable bulkhead walls (galley, wardrobe, closet, etc.) to comply with the HIC requirement.
>
> "3. New methods of head protection have not yet been developed for practical application. (See Aviation Safety Journal Vol. 3, No. 1, 1993 "Developments in Head Injury Protection for Airplane Passengers" by Van Gowdy, CAMI.)
>
> "4. Granting a temporary exemption will not impede development of a technically and economically viable solution.
>
> "5. Dornier is working together with suppliers for seats and interiors, to undertake reasonable design precautions to minimize head injury at these seats.
>
> "6. When a technical and practical solution is available, it will be implemented in Dornier Model 328 production as soon as possible. Dornier will also initiate work with the airlines regarding retrofit of Dornier Model 328 aircraft already delivered.
>
> "7. Until implementation of a new design the safety standard of the seats concerned is equivalent to relevant seat locations in nearly all existing airplanes."
>
> Dornier Report SA40-2677/93 dated August 10, 1993, was included as part of the petition. This report describes the front-row HIC test that had been accomplished to date, which failed; discusses design changes intended to meet HIC requirements; and, proposes estimated schedules for testing the design and then retrofitting the fleet.

A summary of the August 10, 1993, Dornier Luftfahrt petition was published in the Federal Register on September 9, 1993 (58 FR 47522). One commenter, representing an airline pilot organization, responded, and expressed opposition to granting the petition. The commenter feels that compliance with HIC requirements is currently possible, and that compliance should therefore be required prior to allowing the airplane to be placed into service. The commenter notes that failure to meet HIC requirements at the front row passenger seats places those occupants at greater risk of injury or incapacitation than other passengers in the event of a survivable crash.

The commenter consequently disagrees with the petitioner's position statement number seven, in which it was asserted that the seats concerned are of equivalent safety to similar seats in nearly all existing airplanes. The commenter expresses the desire that manufacturers and airlines should consider solutions to the HIC problem other than honeycomb panels, such as shoulder harnesses, airbags, and translating seat pans. The commenter notes that the petitioner's plan does not address a course of action should their HIC

research prove unsuccessful, and that requiring compliance prior to issuance of the type certificate is the only way of assuring a single level of safety in the day-to-day operations of aircraft.

The FAA's analysis/summary is as follows:

The FAA has carefully considered the information provided by the petitioner as well as the commenter, and has determined that there is sufficient merit at this time, due to the lack of commercially available design solutions to the bulkhead-to-seat HIC problem, to warrant granting an exemption that would allow the requested extension to the compliance time for meeting the noted HIC requirements. In making this determination, however, the FAA is aware of some tendency in the field of HIC research for commercially undesirable but otherwise technically promising solutions to be rejected by the aviation industry without adequate substantiation, or for reasons relating to aesthetics. Examples include:

1. Aluminum honeycomb added to bulkheads has been shown to reduce HIC below 1,000 units. Concerns by the operators regarding its appearance, and the susceptibility of unprotected honeycomb to in-service damage, have led primarily to continued research into the possibility of protective coverings, rather than to alternative energy-absorbing materials.

2. A four-strap torso restraint, similar to those currently utilized by flight attendants, would restrain the head from contacting any injurious surface. Operators have rejected this option, asserting that the "complicated" central buckle required would be a safety impediment. They further assert, again without substantiation, that this option would necessitate rigid seatbacks that would unacceptably increase the head injury hazard to passengers seated behind the modified seats, and would also adversely affect the development of 16g seats. Concerns of public relations and passenger reaction have also been expressed regarding designs of this nature, as to possible perceptions of an increased level of danger inherent in seats equipped in such a manner.

3. A single diagonal upper torso restraint strap, in combination with the standard lap belt, similar to those in automotive use, may also provide the required restraint. Operators have also declared this potential option as unacceptable, using unsubstantiated reasoning as outlined above.

Articulating seat pans and air bags are also being actively investigated as possible solutions.

The FAA does not wish a favorable consideration of this petition to be construed as encouragement to other potential petitioners whose justifications may be based solely on unsupported rationales similar to those listed above. Since it is the FAA's intention to foster timely implementation of the HIC requirement, exemptions will not be considered unless the FAA is assured that meaningful research is being accomplished on behalf of the petitioner, and is being conducted in an expeditious manner.

The FAA appreciates and generally concurs with the spirit of the commenter's remarks. However, in response to the commenter's concerns regarding a reduced level of safety for the front row passengers if the petition is granted, the FAA notes that granting a limited extension of the compliance time would result in only a temporary situation in which front row seats on

Dornier 328 aircraft would be no more unsafe than existing front row seats on other, previously certificated aircraft models. Nevertheless, the FAA does not intend to consider any further delay than that already being addressed herein. Subsequent to achieving compliance, these seats would become safer than the vast majority of similarly located seats on older aircraft models. The commenter's remarks regarding a goal of maintaining a single level of safety in service are interpreted to be addressed to that of the Dornier 328 fleet only. As is generally the case with new regulations, HIC requirements are applicable only to newly certificated aircraft, with no provisions for the mandatory retrofit of the existing fleet.

In granting this petition, the FAA recognizes primarily the commercial unavailability of solutions to the HIC problem, and the adverse effect of this condition on the impending October 29, 1993, scheduled type certification date of the Dornier Model 328. The FAA expects that solutions are forthcoming that will be available by the end of this year. At this time, however, the FAA acknowledges that technically feasible solutions have not been developed to the point where they are viable for installation. This situation is expected to change rapidly, and the FAA will expect that all viable solutions, such as those itemized above, are considered.

In consideration of the foregoing, I find that a partial grant of exemption is in the public interest, and will not significantly affect the level of safety provided by the regulations. Therefore, pursuant to the authority contained in §§ 313(a) and 601(c) of the Federal Aviation Act of 1958, delegated to me by the Administrator (14 CFR 11.53), the petition of Dornier Luftfahrt for exemption from the HIC requirements of § 25.562(c)(5) of the FAR, for front row passenger seats located behind bulkheads on Dornier Model 328 airplanes, is granted until June 30, 1994, with the following provisions:

1. The petitioner shall provide this office, at three-month intervals from the issue date of this grant, a detailed progress report of applicable HIC research accomplished in the previous three months, and a schedule of activity intended for the following three months.

2. Within three months of identifying a design solution(s), the petitioner shall provide this office with a schedule for retrofitting the Dornier Model 328 fleet, and assure its complete execution by June 30, 1994.

Note: This exemption expires June 30, 1994. The airworthiness certificates issued for any U.S.-registered airplanes that have not been shown to comply with § 25.562(c)(5) by that date will also expire on that date, accordingly.

Issued in Renton, Washington, on

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Transport Airplane Directorate
Aircraft Certification Service